Railways as a Part of a System of National Defense

AN ADDRESS

By W. L. PARK

Vice-President, Illinois Central Railroad

Before the International Association of Railway Special Agents and Police

At New Orleans, La., May 25, 1916

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Probably few of our citizens, even the most radical, favor a policy of putting the United States on a military basis comparable with that upon which Germany stood at the beginning of the present war. All the traditions of our form of government are opposed to such a course. But ability to defend one's self from aggression, whether as an individual or as a nation, is far from implying a desire to exploit that ability. In no sense whatever can measures of preparation be considered as implying a desire for war. In fact, it is probable that the most pronounced adherents of the preparedness policy are as desirous of avoiding conflict with any other nation as are the most pronounced pacifists. They approach the question from a different angle—that is all. They take into account that in all history certain causes tend to produce certain results and that it is safer to act upon the teachings of that knowledge than to pin faith to an ideal, however desirable the ideal might be if it could be translated into actuality.

Preparedness Does Not Mean Militarism.

It is not necessary or desirable that preparedness for defense should be carried to the extent that militarism implies. If there were no other reason, the diversity of the elements of which our people is composed and the basis upon which they have become a part of our citizenship preclude the adoption of a militaristic policy. The extent of our territory, the sparseness of its population in comparison with the densely populated countries which are necessarily under consideration where this question is involved, render a complete militarization according to their standards out of the question. The expenditure involved would render insignificant the per capita expenditure for similar purposes of any nation now involved in war.

There is, however, a degree of preparation of which

the value appears to be recognized by all except an eloquent minority. It is true that there is a tendency to misconstrue the true purpose of such preparation; but at least its necessity is recognized. The opposing party is unable to explain any manner in which the ends of its policy can be brought about. What the enlightened thought of the people has determined to be essential is that the country should seek to secure itself in such position that if emergency arises it shall not be subjected to immediate defeat. It wants to secure at least time in which to utilize its great resources before being subjected to the ignominy of defenceless punishment.

But there is a considerable section of the people who would end their measures of preparation with the provision of a large army or a large navy, or both. Those who clamor loudest for these outward and visible signs of readiness for whatever may come neglect consideration of equally essential fundamental preparations. An army and navy alone, unsupported by adequate transportation facilities, are merely a transparent bluff. An army, though great as patriotism or conscription can make it and capable as years of training can produce, is utterly impotent without proper transportation facilities for its units and for its supplies. The efficiency of a navy, though it were to outnumber the floating equipment of any other nation, is dependent upon a series of naval bases adequately maintained as to supplies. Under all of these considerations the real dependence of this country in the event of difficulty with any other nation is based upon its transportation system. It is our boast—probably not well founded in fact—that we can quickly provide an army equal to any requirement. The preparation of a transportation system, upon which much of the efficiency of an army, large or small, depends, is certainly a work that requires time.

There is perhaps reason for congratulation that our railroad system as a whole has had its foundations so broadly laid. There is wanting, however, a vast amount of development with a specific purpose in view, before it could begin to fulfill its functions as a part of a system of national defense.

In consideration of some features of the service that would be required of our railways in the event of war with any nation, it will be useful to note some of the demands that are provided for under circumstances in which railways are treated primarily as a part of the military organization. There can be pointed out some of the respects in which our railway system not only falls

short of meeting this standard, but is even inadequate to serve the modest military equipment that we have considered sufficient in time of peace.

Germany's Transportation Facilities.

Admittedly, Germany has reached the highest point yet attained in military efficiency. It has for years recognized the value of sufficient military facilities. To serve as a part of its military organization has been the prime consideration in the construction, equipment, organization and maintenance of its railways. The Army and Navy Journal, April 10, 1915, quotes from the result of a survey by a Dutch general of the development of the German railway system from a military point of view since the Franco-Prussian war. As early as 1870-1871 there were at the disposal of the German military authorities altogether 7 railroad lines in North Germany and 3 in South Germany. Only one, that from Berlin to Cologne, had double track. Yet with these facilities it was possible to convey 16 army corps, an aggregate of 450,000 men, to the frontier in 11 days. Since then military authorities have never ceased in the development of the railway system on a strategical basis. The results are striking. Germany now has 12 double-track railways lying between Osnabruck on the north and Ulm on the south, 125 miles east of the Rhine. Every army corps normally garrisoned east of this district has a double-track railway at its disposal. The same facilities were also available for the reserve army corps formed at the time of mobilization.

No less than 18 double-line bridges were, at the time of the beginning of the war, provided for the crossing of the Rhine. Eight to ten cavalry divisions can be conveyed from the Rhine westward simultaneously with the army corps above referred to. Four brigades with the requisite contingent of cavalry and artillery require 96 trains. All of this number of trains could be dispatched in the same general direction in 12 hours. It was thus possible in August, 1914, to effect the whole transport to the western frontier in about 20 hours. The transport of these troops began on the second day of mobilization, August 3, in the evening. It was completed at noon on August 4. During the night the frontier was passed. Liege was assaulted on August 5 and 6.

For the transportation of troops from the western to the eastern front 6 double-track railways were available. The distance from Maubeuge on the west to Konigsberg, just short of the Russian frontier on the north-

east, is 994 miles. A military train ordinarily makes about 250 miles in 24 hours. The journey, then, occupied about four days. For the transport of 6 army corps of 40,000 men each, a week was generally allowed. The transportation of this number of men required 124 trains and two or three days were consumed in the necessary preparation.

The limited amount of double trackage in this country would make impossible any similar movements except in a few sections of the country, for distances which, though absolutely as great as can be made within the whole German Empire, would be comparatively small when the extent of this country is considered. Nor would double trackage alone, even in Germany, have been sufficient to make the movement possible. The sufficiency of trackage is only one item. Its provision and the entire equipment and organization for its operation, even to a knowledge of what orders would be given under any set of circumstances, have been a subject of expert study and preparation there for 40 years.

During the last twenty months transportation facilities in England and France have been put to a severe test. Apparently they have served their purpose. The chairman of the London & Southwestern Railway stated in February, 1915, that the movement of military and naval organizations had involved up to that time the running of 15,000 special trains. He also said trains had always been ready for the troops and had arrived on or before schedule time. Because of its location the Southwestern has had a large share of the transportation; but several of the other lines reported at about the same date that they had operated from 3,000 to 8,000 special trains in this service. The British transportation service during this war has doubtless owed much of its efficiency to the arrangements entered into between the government and the railways under an act of parliament passed in 1871. The government board is in control of all railway service, but the actual operation in each case is by the railway's own officials.

In France the army took over the entire railway system, absorbing its personnel in the army under direct command of army officers.

The Need of Special Equipment.

In the event of war, the transportation of heavy guns is an important factor. The extent of the special transportation facilities absolutely required is probably but little appreciated. The factories where the guns are made

and repaired must be located at a distance from the place where their use is required. They must be transported to the firing line. The new 16-inch gun now being developed by the Ordnance Department of the United States army is looked upon with special favor by military authorities. It requires a special car for its transportation. The government does not own such a car, but has obtained the use of one through the courtesy of the Bethlehem Steel Company. The 14-inch gun is transported on a 200,000-lb. flat car with an ordinary flat car serving as a trailer. Lt. Col. James E. Hoffer, of the office of the Chief of Ordnance, wrote on December 29, 1915, that there had been no difficulty in obtaining the use of such cars on short notice. This, however, is doubtless explained by the fact that there is no demand for such cars in quantity. Only two or three roads, according to the Official Railway Equipment Register for May, 1916, have cars of any class approaching this capacity. The Norfolk & Western has 750 gondolas of 180,000 lb. capacity. The Pennsylvania has about 120 flat cars of 150,000 lb. capacity. Most roads have no flat cars of above 50 tons capacity. The flat car of 200,000 pounds capacity that has been built is for the occasional transportation of heavy guns from the factory to the proving ground, and others approaching that capacity are, with the exception of the Norfolk & Western coal cars, which are in regular service, for limited service of a special nature.

Some of the requirements in the direction of special rolling-stock equipment are indicated by the weight and dimensions of certain of the larger guns constructed by the United States government for coast defense and general service. These are as follows, on the authority of Lt. Col. Hoffer:

Caliber	Weight, Pounds	Length	Width
12 in.	132,000	42 ft.	66.2 in.
14 in.	139,000	48 ft. 3 in.	66.7 in.
16 in.	284,000	49 ft. 3 in.	90.5 in.
*16 in.	367,000	67 ft. 2 in.	88.0 in.

The significance of this lack of equipment can only be brought home by a consideration of the requirements of service in view of the short life of heavy guns under firing conditions. All 16-inch guns, therefore, will require for their transportation cars of a capacity of which none have been built except one in possession of the Bethle-

*Figures relating to the new 16-in. gun are taken from the design, the gun itself not having been built at the date of Lt. Col. Hoffer's letter.

hem Steel Company. There is only a limited number of cars capable of being used for the transportation of 14-in. guns. Col. B. W. Dunn, chief inspector of the Bureau of Explosives, American Railway Association, says the number of rounds that heavy guns can be fired before it is necessary to return them to the factory to be relined "depends upon the kind and quantity of powder used in the charge and also upon the action of the rotating band. It was thought some years ago that our most powerful 12-in. gun might not last over 75 rounds, but an enlargement of the rotating band gave so much better results that we now hope to see them last as much as 200 rounds. As a rule, the larger the gun, the shorter the life as measured by the number of rounds fired. My guess (I am quoting Col. Dunn) for the life of the new 16-in. gun would be from 150 to 200 rounds." In the same letter Col. Dunn gives the following information as to the rapidity of fire of these guns: "The only (16-in.) gun now built has not yet been mounted regularly on a carriage destined for it, and we have no data as to the rapidity of fire. A 12-in. gun on a similar mount has been fired as often as 30 rounds at the rate of two rounds a minute. It is estimated that the 16-in. gun can be fired, if desired, as rapidly as one round per minute and possibly faster."

There are 1,440 minutes in a 24-hour day. Under ordinary favorable circumstances in a continuous action, offensive or defensive, from 8 to 10 guns per day would be required to give the service of one. That is, replacement of each gun,—the removal of the exhausted gun and the placing of a substitute—would have to go on at the rate of one for every two and a half or three hours. And for this service between each point of action and the distant factory, the special equipment would be required. Contrary to the general supposition that a position strongly fortified with heavy guns can be supported by the use of those guns until the determination of the action, the foregoing statement indicates how short-lived a fortification must be without the requisite transportation facilities for the necessary relay guns.

The Requirement as to Standard Equipment.

Adequate facilities are also essential for the transportation of ammunition. Henry Maxim, inventor of explosives, is quoted in a recent book "War's New Weapons," as saying that "within a circle of 160 miles around Peekskill, N. Y., as the center, will be found 90 per cent of the arms and ammunition works, military stores, smokeless powder works, torpedo works,

and torpedo boat works of the entire country."

It is about 2,500 miles in an air line from this center to the Pacific Coast and about 1,600 miles to the Rio Grande. Transportation routes are much longer. Either transportation facilities must be adequate to annihilate those distances without delay in the delivery of munitions to the various points where they may be of vital importance, or plants for the manufacture of such munitions should be located at points far in the interior. In the way of insurance, either provision or both would seem to be a not over-adequate measure of preparation for possible contingencies.

It is trite to say that an army fights upon its stomach. But if the matter were analyzed in all its bearings, it would be difficult to determine whether supplies of ammunition for the guns or food and other necessities for the men themselves are the more important. But so far as the equipment of the railways of the United States is concerned, the transport of commissary supplies presents no difficulties that are not a part of the general railway problem, as is the case of the special equipment required for heavy guns. What is required for this service is sufficient rollingstock and terminal facilities, particularly facilities for rapid loading and unloading. The same facilities would be extremely serviceable in time of peace.

Transportation of wounded or incapacitated is as important for those still engaged as for the disabled ones themselves. In the British army transportation of the wounded is based on two principles: The maintenance of the mobility of the army by relieving the fighting troops quickly of all who have become non-effective; and the rapid removal of the latter into a region where the best skill and the most favorable conditions are available. Under some conditions this need can be met to a limited extent by the use of water transportation; but the capacity of barges drawn by tugs and such other limited water carrying transport facilities as may be available, as well as means of water communication itself, may be wanting or limited so as to render this adjunct negligible. The main reliance, under all but exceptional conditions, must be upon the available facilities for transport by railways.

In addition to the fighting forces themselves, their heavy guns and ammunition for the light as well as for the heavier pieces, and the continuous service required for the bringing in of commissary supplies and the removal of the wounded or incapacitated, modern warfare as it has developed in its latest example demands a vast

supply of equipment never before provided for. Motor power in every form has not only largely superseded the use of horses, but has been put to new uses. The Army and Navy Journal refers to motor plows as used for digging trenches. These plows dig trenches three feet deep and do it faster than a hundred men with shovels. Caterpillar tractors, familiar on the prairies of Iowa and Illinois, haul the heavier siege guns. Searchlight wagons light the fields by night. Powerful trucks equipped with dynamos are used for charging wire entanglements. Motor aeroplane towing and repair wagons as well as motor mail wagons are extensively used.

Motor transportation may be considered as supplying the requirements of local service close to the fighting lines as adjuncts to the railways performing through service. There are available in accounts of events in the European war numerous records of the transportation of a considerable army over appreciable distances by means of motor cars. In the earlier weeks of the war, General Gallieni made a sortie from Paris in 4,000 taxicabs and small automobiles. Nine men were put in each. In six hours 70,000 men had been transported about 35 miles. An entire British army of 200,000 men was similarly transferred across country 170 miles in three days.

The significance of these facts in connection with a consideration of preparedness as relating to railways lies in the fact that this special equipment is not likely to be available in quantity at the precise points at which actions are taking place. Most of it must be manufactured at perhaps hundreds of miles from the place where its services are required. It is the function of the railways to serve as the means of transport between places of manufacture and point of use. The service is likely to be continuous in one direction or another so long as it may need to exist at all. In connection with the present war, the life of a horse has been estimated at about 30 days. The life of a motor vehicle, taking into account the forced mileage and rough handling, is probably not so great, at least up to the time that general overhauling and repairs are necessitated.

The use of motor vehicles is not confined to the requirements of the personnel. Backward as is the United States in any matter looking toward military efficiency, the use of motor traction is contemplated in connection with designs for a 9.5-in. howitzer which are nearing completion and designs for an 11-in. howitzer which are under way. The latter piece is expected to be mounted

upon a special vehicle to be drawn by a motor tractor. One type of heavier howitzer has been recommended by the Chief of Ordnance to be mounted upon railroad trucks so as to be fired therefrom. Ordnance officers are quoted as having stated that the size of the larger guns will be limited only by the means of transportation.

Col. Dunn has described one close connection made by the Germans between the army and the transportation lines in which the service of the latter is direct. According to the best information available, he says, the Germans have been using two types of 42-centimeter guns. The more powerful and heavier model is transported from place to place on a special car running on railway tracks. When it is desired to fire the gun arrangements are made for lowering the weight to a specially built platform consisting of heavy bolted timber. This relieves the trucks of the weight of the gun so that the special car takes none of the strains due to firing. The projectile weighs 1,918 pounds and the maximum range is said to be over nine miles. A type of howitzer of considerably lower power, with a range of nearly 5 miles, is transported by tractors over ordinary roads.

The statement that the size of guns and the extent of their use will be limited only by the means of transportation suggests two of the more important requirements of the facilities of transportation. These are in addition to the special equipment required for the 16-in. guns, as before described. Because this class of equipment is special it should be the property of the government. Such cars in number sufficient to move all the larger guns to any distance and with any frequency required, should be at the service of the government at the place where the guns are constructed or where they, after construction, have been placed. They are suitable only for this class of loading. Railroads cannot be expected to look with favor upon the tying up of so much of an investment as would be required in making them a part of their regular equipment in view of the extremely indefinite frequency of their use.

The first general requirement is a sufficiency of equipment not only for the conveyance of troops and of ordinary supplies, but of such rolling stock as is adopted for the transport in quantity of the heavier items of military outfitting as above mentioned, in addition to that which is necessary to carry on ordinary transportation service. The ordinary demands of transportation service cannot be left out of the account. In many respects the

supply of rolling stock equipment fails to be adequate in times of peace. The special demands created by a condition of warfare would magnify this deficiency, at least locally. What would amount to a considerable surplus of equipment under ordinary traffic conditions would be quickly wiped out if the railways should be called upon to perform their essential functions as a part of a system of defense.

Railway Equipment Required for Movement of Military Units at War Strength.

The accompanying table gives an idea of the amount of railway equipment that would be required in the event of mobilization and movement of various military units. The figures were obtained from the War Department by J. E. Baker, of the office of Vice-President and General Manager W. R. Scott of the Southern Pacific, at San Francisco:

	PERSONNEL					RAILROAD EQUIPMENT REQUIRED							
	Officers	Men	Animals	Vehicles	Guns Complete	Pullman	Coaches	Baggage	Box	Stock	Flat or Gondola	Total Cars	Track--ft.
Infantry regiment	55	1890	177	22	...	5	43	5	15	9	8	85	5150
Cavalry regiment	54	1284	1438	26	...	8	28	8	25	72	9	150	7850
Artillery regiment---Light	45	1170	1157	32	24	9	23	9	25	58	46	170	8675
Artillery regiment---Horse	45	1173	1571	35	24	10	24	10	25	78	47	194	9830
Artillery regiment---Mountain	45	1150	1229	...	24	7	23	7	30	61	...	124	6405
Engineers---Pioneer battalion	16	502	165	12	...	2	12	2	10	8	4	38	2110
Signal Corps---Field battalion	9	171	206	15	...	2	4	2	5	10	5	28	1460
Infantry division, comprising: 3 brig. inf., 1 regt. cav., 1 brig. light arty., 1 pioneer engr., 1 field battalion signal corps and necessary wagon trains	736	22285	7660	775	48	46	487	45	245	383	301	1507	82265
Cavalry division, comprising: 3 brig. cav., 1 regt. horse arty., 1 pioneer engr., 1 signal corps battalion, and necessary wagon trains	458	10259	12231	414	24	63	218	63	210	611	137	1302	77190

To move a field army would require: 2115 passenger cars; 385 baggage cars; 1055 box cars; 1899 stock cars; 775 flat cars; total, 6229 cars, which make about 366 trains, and require this number of locomotives.

Track and Terminal Facilities.

Of fully as great importance as an adequate supply of equipment is the requirement that all roadway and track facilities be put in proper condition. This point may be specially emphasized in view of a too-well-founded impression that on many lines during the last two or three years of business depression maintenance of way has been somewhat neglected. Inadequacy of facilities all along the line comes to a head at terminals. Within the last few months we have seen the far-reaching effects of a condition calling for a bunching of equipment at a few points. Such a condition is liable to arise at any one of a large number of points where it might be necessary to undertake measures of defense. It cannot be mitigated by any of the measures which may be partially effective when only commercial considerations are involved. Embargoes, or the condition that necessitates their declaration, would mean starvation to the defensive forces; demurrage would be payable in the lives and property of non-combatant citizens.

Improved Facilities Not Merely a War Measure.

On the same basis upon which certain optimists have endeavored to discover a brighter side to the European conflict because it has taught millions of people to save what they ordinarily would waste and to do what ordinarily they would have left undone, it may be that if the possibility of war failed to ripen into actuality, the general acceptance of its possibility would be beneficial to the railways of the United States. Very many of the measures which it would be imperative for the railways to take preparatory to the performance of their functions as a military adjunct, are precisely the measures they ought to be put into condition to take in fulfillment of their functions as the agents of peaceful prosperity. With the exception of a few special items, to some of which reference has been made, the provision of more equipment and the improvement of all facilities would not be merely a war measure. But the first thing to find out is exactly in what our deficiencies consist.

Aside from the general requirements that the condition of the railways in respect to sufficiency of equip-

ment and the condition of the roadway and track facilities should be made the subject of serious study, with the view to supply their deficiencies, there are special reasons why such a study should be made under present threatening circumstances. There is no sense in providing for a large army if it cannot be transported without delay to any point where its services may be required. This involves the requirement that the condition of now insignificant short lines and branches be studied to the same extent as the great arteries which serve all the purposes when ordinary commerce alone is in question. There is no sense in making big guns or large capacity cars on which to carry them if the roadway and structures over which they must travel are inadequate to support the load. Probably the transport of heavy guns involves the greatest single concentrated load to be handled, and it may therefore be taken as determining the maximum degree of sustaining power required of roadway and structures.

An examination of track as well as of all other facilities could best be made by a board composed of railway and army experts. A board of army experts and practical railway men, working in co-operation with the general staff of the army, should be able to accomplish much in determining what would be necessary to fit our railway system as a whole to be operated as a unit and to the greatest efficiency for defensive purposes.

Preliminary Study of Present Conditions.

If not already accomplished, the work of the general staff would probably consist largely in working out, so far as transportation lines are concerned, what would be the demands upon them at any point of the United States boundary in meeting attacks that might be made at such points. These plans would not be theoretical, but based upon what could actually be carried out with existing forces and supplies. This class of work has been an important feature of what Germany has been doing for many years. The exact knowledge of conditions has been as important as the provision made in adapting its railway system to meet them in the case of an offensive movement without bungling or hesitancy as to any of the steps to be taken. The results of similar knowledge on the part of other nations were illustrated in the mobilization of most of the troops engaged in the present European war, but particularly is this true with respect to Germany. The absence of such preliminary knowledge in the United States was painfully illustrated

in the Spanish war, particularly at Tampa and at points on the Pacific Coast in connection with the campaign in the Philippines.

Through the proposed board the general staff should be informed of the facilities that are now available and of what would be necessary in order successfully to carry out its plans. An expert examination should be made of all roadways and structures over which movements would be likely to take place, to ascertain their condition as to strength and capacity. If too weak or of insufficient capacity, steps for remedying the deficiency should be recommended. The whole outcome of a defensive movement might be reversed by inability to transport some heavy guns across a bridge too weak to permit their passage; or the absence of special cars for carrying heavy guns; or lack of sufficient track and equipment facilities to transport the required number of troops or quantity of supplies within a limited time.

Such a board would keep a live list of all motive power and cars, classified by roads, number and capacity. It should know the location and capacity of all loading and unloading platforms and the steps to be taken to construct them in time of necessity. Lack of these facilities entails delay and congestion. This was noticeable at Tampa in the Spanish war. In some measure difficulties under this head arise in movements to encampments in time of peace. The board should recommend not only what improvements should be made but by whom their expense should be borne. In any preliminary preparations it obviously would be unjust to compel the railways to stand the expense of providing purely military facilities which could be of no value in their ordinary commercial business.

Employees Must Be Under Control.

But the railways cannot be depended upon even to the limit of their present efficiency unless means can be provided for their protection against defection within their own organization. At the present moment, when trouble from any one of three or more foreign sources is threatened, four of the most powerful organizations of labor concerned in railway operation are threatening to tie up every mile of railway in the United States unless certain extreme demands for increased wages are granted. These employees know, because they are a part of it, the vital function the railways perform in the commercial prosperity of the country. They know the dif-

ficulties through which the railway industry has been passing in the last few years and they know that it is impossible for the railways to meet their demands except there shall be granted measures of relief which must come, if at all, from sources entirely beyond the control of the railways themselves. They know, also, these same organizations that are now threatening to strike, that at a crisis in national affairs such as may materialize at any moment, a strike by operating railway employees would be an act of treachery to the nation to which they belong of which there is no parallel in the civil or military history of any country.

Whatever measure of control the government may be forced to assume over the railways as a part of a system of national defense will be wanting in effectiveness unless it includes absolute control over the personnel of the operating organization. No amount of study or fulfillment of requirements of plant and plans of operations will avail if there is chance of failure on the part of the employees engaged in operation. Employees who have to do with the operation of trains should be held strictly accountable for their acts. Considering the important part that the transportation system must play as an instrumentality in national defense and the fact that no human foresight can anticipate the exact time when our country may become involved in war, it would not be too much to provide that under no circumstances should a strike that would interfere with transportation be permitted to be called until after all the points in controversy had been submitted to arbitration. In case of actual hostilities all employees should be placed under military control, and any failure to stay at work and perfrom their duties should be made punishable just as the failure of a soldier to perform his duties is punishable. The safety and welfare of the nation must be given precedence over all other considerations.